Strapping Wings on a Caterpillar and Calling it a Butterfly: When Systemic Change is Not Systemic*

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Abstract

This article challenges misperceptions about the definition of systemic change in school districts. While many contemporary change efforts are described as "systemic," in fact, they are not. The author also argues that a special instance of systemic change known as systemic transformational change is required to transform entire school systems to meet the requirements of our 21st Century Information-Age society. He then shares his personal views of what systemic transformational change means to him. A significant portion of the article focuses on the nature of systemic transformational change in school districts and what is required to create and sustain that kind of change. The article concludes with a brief discussion of the kind of leadership needed to create and sustain transformational change.

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To transform something is to change its fundamental external form or inner nature... In the world of nature, a caterpillar is transformed into a butterfly; its DNA remains unchanged, but its form and properties are fundamentally different. A butterfly is not a caterpillar with wings strapped on its back.

(Nevis, Lancourt & Vassallo, 1996, pp. 11-12).

Overview

This article begins with a vision for the future of schooling in 21st Century America. Achieving this vision requires the transformation of entire school systems. Some of us who are advocates of transforming school systems believe that transforming school systems requires four new paradigms: one for teaching and learning; another for how school systems are organized and perform as systems; a third for how districts interact with their external environments; and a fourth new paradigm for how to create and sustain change.

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The article continues with a discussion of common misperceptions about the meaning of systemic change in school districts; misconceptions fed by confusion about the definition of the term "systemic change." Following the discussion of the definitional confusion, core principles of systemic change are presented and a comparison between piecemeal and systemic change is drawn. Next, a more comprehensive definition of systemic change is offered—a definition characterized as "systemic transformational change." Systemic transformational change is required if paradigm-change is desired for a school system. The expanded definition provided in this article: includes a discussion why the current design of school systems cannot get us to where we need to be, explain why transformational change is complex and messy, clarifies why piecemeal change is inappropriate when transformational change is required, explains how a system's performance ceiling requires transformational change if a system wants to break through that ceiling, points out how dysfunctional system dynamics require transformational change in response to the dysfunction, and describes three paths to systemic transformational change that must be followed to create and sustain four paradigm shifts. The article concludes with a discussion of how leadership for transformational change requires living with paradoxical situations.

The Future of Schooling in America

Richter and Reigeluth (2007, pp. 1-24) build a powerful case for systemic transformational change in American school systems. Their article is based on Richter's doctoral dissertation at Indiana University (Richter, 2007). The core premise of their argument is that the current paradigm for schooling in America is driven by the needs of the Industrial-Age; but our society is well into the Information-Age, which has different requirements for educating students. The essential elements of their argument are presented below.

Changes in Society Make the Design of Current School Systems Obsolete

As the United States evolves deeper into the Information-Age, our society's needs and problems are changing dramatically. Richter and Reigeluth suggest that these dramatic changes in our society require comparable dramatic and deep systemic changes in how school districts deliver education services to students. But, the typical response in school districts to this growing mismatch between our society's needs and how children are educated is the piecemeal, "fix-the-broken-part" approach to change. A reading program does not work well, so remediation is offered. Test scores fall, so yearly statewide testing is increased. A middle school is failing, so a "heroic principal" is brought in to save the day. These changes are made by school systems in response to symptoms of systemic distress—distress caused by dysfunctional system dynamics created by applying principles of piecemeal change when principles of systemic change are required.

Richter and Reigeluth believe that the fundamental paradigm of schooling in America's school systems needs to be transformed to satisfy the requirements of the Information-Age. For example, regarding "time to learn" it is known that different students learn at different rates (Mayer, 1999), yet educators typically require all students to learn the same amount of content in the same amount of time. By holding time constant, educators force achievement to vary. According to Richter and Reigeluth, the current design of school systems was intended for sorting students rather than for learning, which was appropriate in the Industrial-Age because we did not need to and could not afford to educate large numbers of students to high levels. But the Information-Age, with its predominance of knowledge work (a term coined by Peter Drucker, 1969) and demand for higher-order thinking skills makes learning a much higher priority than sorting.

In the Information-Age paradigm, according to Richter and Reigeluth (2007, p. 2), it is no longer acceptable to promote learners to the next grade-level simply because they have spent a year at the previous grade-level. It is no longer acceptable to emulate the factory model and to teach all children at the same rate. In the Information-Age paradigm, they argue, we need to educate more children to their potential. Faster learners must no longer be forced to waste time until the class is ready to move on, and slow learners must no longer be forced to move on before they have mastered the content, thereby forcing them to accumulate learning deficits that make it exceedingly more difficult to learn future material that builds on that content.

Key Markers for the Industrial-Age Compared With Those for the Information-Age

Richter and Reigeluth identified and compared key markers illustrating differences between the Industrial-Age and Information-Age paradigms. The markers are shown in Table 1.

Table 1: Key markers of the Industrial Age and the Information Age	
Industrial Age	Information Age
StandardizationBureaucratic organizationCentralized controlAdversarial relationshipsAutocratic decision makingComplianceConformityOne-way communicationsCompartmentalizationParts oriented-Planned obsolescenceCEO or boss as "king"	CustomizationTeam-based organizationAutonomy with accountabilityCooperative relationshipsShared decision makingInitiativeDiversityNetworkingHolismProcess orientedTotal qualityCustomer as "king"
From Reigeluth (1999, p. 17). Used with permission	

Table 1

Richter and Reigeluth began their comparison of the key markers by noting that co-evolution happens when systems evolve in ways that satisfy the needs and requirements of their external environment. They discuss how co-evolution already has happened for our society and its institutions; that is, our contemporary society has evolved from the Agrarian-Age (in which agricultural activities formed the backbone of society) to the Industrial-Age (in which the assembly line and mass production created products and goods for consumption by the public); and, America's school systems also co-evolved with those societal changes.

Our society has now evolved into the Information-Age in which knowledge work has replaced manual labor as the predominant form of work. Most of America's organizations are co-evolving to meet the requirements of the Information-Age. The institutions that are not co-evolving to meet the needs of the Information-Age are America's school systems.

As can be seen in Richter and Reigeluth's Table 1, the key markers of the Information-Age portray a paradigm that is significantly different from the Industrial-Age paradigm. The Information-Age markers focus on teams over bureaucracy, on autonomy over control and command, and on initiative over compliance. In the same way, the needs of our Information-Age society now require school systems to create and adopt substantially different criteria for evaluating their success as systems—criteria that correspond closely with the Information-Age key markers. To be relevant and meet the needs of our 21st Century society, Richter and Reigeluth conclude that school systems must seek to evolve in ways that correspond with the needs and requirements of the Information-Age. Co-evolution requires transformational change to create and sustain the four paradigm shifts described earlier.

In the Beginning There Was Confusion

Some of us in the field of education believe that the future of education in America, as described above, requires the total transformation of America's school systems—a transformation that will shift school districts from the Industrial-Age paradigm to an Information-Age paradigm. Paradigm change requires transformational change, not piecemeal change. Yet, piecemeal change is the dominant approach used to improve schooling.

Piecemeal change is also often mistakenly characterized as "systemic change." This mischaracterization reminds me of a question I have addressed repeatedly in my writing, teaching, and speaking about systemic change in school districts over the past quarter century: "When is systemic change not systemic"?

There are many often conflicting definitions of systemic change (described below). The definitional uncertainty still baffles practitioners and policymakers today and I see this confusion appearing in publications on school improvement; for example,

- When I see articles about building-level change that are characterized as systemic change;
- When I read articles about systemic change that only focus on improving student performance on achievement tests; and,
- When I read articles that claim that curriculum improvement is an example of systemic change.

All of the above changes can be part of a systemic change initiative, but, by themselves, they are not examples of systemic change. Calling these kinds of changes systemic is analogous to strapping wings on a caterpillar and calling it a butterfly.

Definitional Confusion

There are several different definitions of "systemic change" used in the school improvement literature. This definitional confusion was identified by Squire and Reigeluth (2000). Reigeluth and Duffy (2006) commented on these different definitions. They are:

Statewide policy systemic change. Systemic change used in this context creates statewide changes in tests, curricular guidelines, teacher-certification requirements, textbook adoptions, funding policies, and so forth that are coordinated to support one another (Smith & O'Day, 1990). This meaning is how policy makers typically think of systemic change.

Districtwide systemic change. From this perspective, systemic change produces changes in curriculum or programs instituted throughout a school district. This meaning is how P-12 educators typically think of systemic change.

Schoolwide systemic change. People holding this view of systemic change focus on what happens inside individual school buildings. Systemic change in this context is any change or program instituted throughout a school. This meaning is how educators participating in groups such as the Coalition of Essential Schools typically think of systemic change.

Ecological systemic change. From this point of view, systemic change is based upon a clear understanding of interrelationships and interdependencies within the system of interest and between the system of interest and its external systemic environment. Change leaders subscribing to this view recognize that significant change in one part of their system will require changes in other parts of that system. Of necessity, this meaning of systemic change subsumes all the other three meanings, and it is how systems thinkers view systemic change (see e.g., Ackoff, 1981; Banathy, 1996; Checkland, 1984; Emery & Purser, 1995; Senge, 1990).

The first three definitions apply principles of systemic change, but they are not truly systemic. The fourth definition is an example of systemic change, but it does not always create transformational change. Thus, the one definition of systemic change not included in Squire and Reigeluth's original compendium of definitions is one for systemic transformational change. Before exploring this special instance of systemic change I will first present additional information about systemic change.

Principles of Systemic Change and Why It Is Important

Russell Ackoff (1981, 1999, 2001) is an early pioneer of systemic change in organizations. He tells us that it is pure folly to improve parts of a system (as in focusing improvement only on a school building or a level of schooling like high school reform). He says that not only will the entire system fail to improve by improving the parts, but it is likely that this piecemeal focus will actually cause the system's performance to deteriorate.[1] Ackoff (1999, pp. 6-8) also offers eight characteristics of systems that enlighten us about why piecemeal change fails to improve systems. The eight characteristics adapted for school systems are:

1. The whole system [e.g., a whole school system] has one or more defining properties or functions; for example, a defining function [i.e., a system's main purpose] of a school district is to educate students.
2. Each part in the system [e.g., each school in a district] can affect the behavior or properties of the whole; for example, a couple of low performing schools in a district can drag down a whole school district.
3. There is a subset of system parts that are essential for carrying out the main purpose of the whole system but they cannot, by themselves, fulfill the main purpose of the system; e.g., teachers and classrooms in a single school building are essential parts of a school system and they are necessary for helping a school system fulfill its main purpose, but these "parts" cannot and never will be able to do what the whole system does.
4. There is also a subset of parts that are nonessential for fulfilling the system's main purpose, but are necessary for other minor purposes (e.g., in a school system these important, but nonessential parts include school and community relations, pupil personnel services, among others).

[1] However, a whole-system change effort can begin within a "part" of a system as long as that starting point is the first step in a whole-system change initiative. Determining which part to start with also requires the application of strict selection criteria; e.g., select a starting point that is powerful and resilient enough to fight off pressure from unchanged parts of the system to "kill" it.

5. If a system depends on its environment for the importation of "energy" (i.e., human, technical, and financial resources), then that system is said to be an "open system." A school district is an open system. Its environment consists of its community, individuals, groups, the state and federal governments, and society in general. That part of a school district's environment that it can influence, but not control, is called its "transactional" or "task" environment. That part of the environment that a school district is affected by but cannot influence nor control is called its "contextual" or "general" environment. To succeed, school systems need to improve their relationships with their transactional environments and work to anticipate influences from their contextual environments.
6. The way in which an essential part of a system affects the whole system depends on its interaction with at least one other essential part; e.g., the effect a single school has on the whole district depends on the interaction that school has with other schools in the district. For example, let us say that a school district is organized pre-Kindergarten-12th grade. This means the work process for that district is 13 steps long (preK-12th grade). Now, let us say that district leaders are concerned about the performance of their high school (which represents a subset of the system). The high school contains grades 9-12. Then, let us say that the performance of that high school is dragging down the overall performance of the district on state assessments. According Ackoff's systems principles, it would be a mistake to focus improvement efforts only on the high school because that high school's performance is affected by at least two other subsets of schools (i.e., the elementary and middle schools that "feed" kids into those high schools). Since all essential parts of a school system interact and affect each other, it would be reasonable and "systemic" to examine and determine how these parts are affecting the performance of the high school. Focusing improvement only on the high school would be a non-systemic and, therefore, piecemeal approach to improvement.
7. A system is a whole entity that cannot be divided into its individual parts without loss of its essential properties or functions. For example, the dominant approach to school district improvement is called school-based or site-based improvement. This approach has had the consequence of deconstructing school systems into their aggregate parts (individual classrooms, schools, and programs). Further, individual classrooms, schools, and programs do not and never will provide children with a total education; they only provide children with a partial education represented by the curriculum for the grades embedded in a particular school or level of schooling. When efforts are made to improve a school system in this way—by disaggregating it into its individual parts—a system's effectiveness deteriorates rapidly.
8. Because a system derives its effectiveness from the synergistic interaction of its parts rather than from what the parts do independent of the system (i.e., the whole is always greater than the sum of its parts), when efforts are taken to improve the individual parts separate from the system (as in school-based improvement), the performance of the whole system, according to Ackoff, deteriorates and the system involved may be significantly weakened. This is one reason why I believe that school-based improvement has generally failed to improve schooling to the degree that it needs to improve.

So, the answer to my earlier question, "When is systemic change not systemic?" is —"When it focuses on anything less than the whole-system."

Piecemeal Change versus Systemic Change in School Districts

Piecemeal change. Ever since John Goodlad proclaimed in 1984 in A Place Called School that the school building was the appropriate unit of change for improving schooling, that approach—improving one-school-at-a-time—has dominated efforts to improve schooling in America. So, why, after applying that philosophy over all these years has so little changed? It is because that approach, while important and still needed as an element of a systemic transformational change process, is by itself inherently insufficient because it disregards the nature of school districts as intact, organic systems governed by powerful principles of complex adaptive systems (e.g., Dooley, 2004; Olson & Eoyang, 2001). It is also insufficient because it is a piecemeal approach that fails to comply with systems principles like those identified and described by Ackoff (described earlier).

Despite a strong desire by some educators to transform their school systems they have been unable to do so because of the inherent deficiencies of the one school, one program-at-a-time approach to improvement. Given

this insufficiency of the traditional approach to school improvement there is a mobilizing call for systemic change (e.g., Supovitz, 2006; the Stupski Foundation at www.stupski.org[2] ; and the Harvard Graduate School of Education in collaboration with the Harvard Business School created a joint venture called the Public Education Leadership Project (PELP) (at http://www.hbs.edu/pelp/ knowledge/[3]).

Systemic change. In the field of organization development the alternative to piecemeal change is systemic change. Systemic change has a mysterious sound to it. Some people have a hard time getting their minds around the idea, and they cannot envision a school district as a system. All they see is a collection of unconnected or loosely coupled individual schools, classroom, and programs. Some people catch a glimpse of a district as a system, but cannot hold onto the image. Still others define a school system as a classroom inside a school inside a cluster of schools inside a district inside a community inside a state inside a region inside the country inside the world inside the universe. This mental model is often referred to as a "nested system" (e.g., Bronfenbrenner, 1977, 1979). Although theoretically correct, the nested system mental model is notably useless for informing the practice of school district transformation. How can anyone transform a system that complex? Instead, the "system to be transformed" is everything inside what is commonly called a school district and everything outside that system is its external environment (see Emery & Purser, 1995). Then, efforts are made to transform the system inside the circle and to transform the system's relationship with its external environment.

What Systemic Transformational Change Means to Me

Now, I would like to share a few thoughts with you about what systemic transformational change means to me. Let me begin with a definition. Eckel, Hill and Green (1998, p.3) define this special form of systemic change as one that:

1.alters the culture of the system by changing select underlying assumptions and institutional behaviors, processes, and products;

2.is deep and pervasive, affecting the whole system;

3.is intentional; and

4.occurs over time.

I added the following two requirements to the above definition:

5.creates a system that continuously seeks an idealized future for itself; and

6.creates a future system that is substantially different than the current system; that is, the system must be transformed to perform within a different paradigm.

The Current Design of School Systems Cannot Get Us to Where We Need to Be

Systemic transformational change creates a substantially different organizational reality in a school system. It does not focus on fixing the parts of the system. Here is an analogy that reinforces that point. If you have good car (your current system) that gets a flat tire (a broken part) you might ask, "Why not just fix the flat and keep moving on"? Fixing the flat is an example of piecemeal change. The "fix" works if your goal is to keep your current "good car" and if the car gets you to where you need to go. But what if your "good car" cannot take you where you need to go? What if instead of a car you need an airplane? If you need an airplane, fixing the flat tire and continuing on your way in your good car will not get you to where you need to go. To get to where you need to go you need a completely different system. And no matter how many parts you fix or replace in your good car, that car will never be an airplane; so, you will never get to where you need to go, and you will continue to suffer from not having the airplane that you need.

The above analogy captures the conundrum we face in education. The old paradigm for schooling cannot get us to where we need to go. Fixing the parts of school systems designed for success in the Industrial-Age will not get us to where we need to be; that is, we need whole new school systems that are totally aligned with the needs and requirements of the Information-Age in 21st Century America.

Transformational Change is Complex and Messy

Creating and sustaining transformational change in school systems is complex and messy. One of the reasons for this condition is that within each school district there are multiple realities encased in the mental models of the educators working in those districts; not to mention in the mental models of key external

[2]http://www.stupski.org/

[3]http://www.hbs.edu/pelp/%20knowledge/

stakeholders who think they know what is best for a school system. Effective transformation requires the blending of the existing multiple realities into a shared reality of a desirable future for a school system.

Another reason for the complexity and messiness of transformational change is that it is insufficient simply to create a blended, unifying vision of a desirable future for a school system. The literature on transformational change repeatedly reinforces the need for people in organizations to change the way they think and act along three change paths (which are identified below, but described in more detail later in this article):

- Path 1—transform their system's core and support work processes;
- Path 2—transform their system's internal social infrastructure (which includes organization culture, the organizational mental model, organization design, job descriptions, reward system, and so on); and,
- Path 3—transform their system's relationship with its external environment.

Transformational change is also complex and messy because educators not only must create change along the three paths identified above but if they want to create and sustain systemic transformational change, then they need make four paradigm shifts as they move along the three change paths. The four paradigm shifts are:

- Paradigm Shift 1: shift from the current paradigm of schooling (the Industrial-Age paradigm) to a new paradigm (the Information-Age paradigm); and, include the support work processes in a school system within this shift (this is done by moving along Path 1: transform the system's core and support work processes).
- Paradigm Shift 2: shift from a command and control organization design to a participatory organization design (this is accomplished by moving along Path 2: transform the system's internal social infrastructure; which requires changes to organization culture, the organization's mental model, communication practices, job descriptions, reward systems, and other elements of the social infrastructure).
- Paradigm Shift 3: shift from a reactive stance in response to the environment to a proactive stance (this shift is made by moving along Path 3: transform the system's relationship with its external environment).
- Paradigm Shift 4: shift from a piecemeal approach to change to a systemic transformational approach to change (this shift is made by following the three change paths and abandoning the piecemeal approach to change).

An early challenge for managing the complexity and messiness of transformational change is to convince educators that transformational change is needed. Telling them that this kind of change is needed is inadequate. They have heard these kinds of calls for change before. They must be provided with compelling data that not only point out the need for change, but also shine a bright flood light on the opportunities that systemic transformational change provides to them, their students, their districts, and their communities. "Need data" push people toward change. "Opportunity data" draw people toward change. Both kinds of data are critical for motivating educators to allow their mental models to become malleable and therefore capable of considering previously unconsidered possibilities for transforming their school systems.

When Transformational Change is Required Piecemeal Change is Inappropriate

When systemic transformation is required piecemeal change to create that transformation is an approach that at its worst does more harm than good and at its best is limited to creating pockets of "good" within school districts. When it comes to transforming schooling, however, doing more harm than good is immoral and creating pockets of good in a district is not good enough. To create excellence within school districts, change leaders must help their systems create and sustain four paradigm shifts (described above) that will move their districts from an Industrial-Age approach to teaching and learning that is standardized, time-based, and sorting-focused to an approach that is more appropriate for the evolving Information-Age—one that is customized, attainment-based, and learning-focused (Reigeluth, 1994).

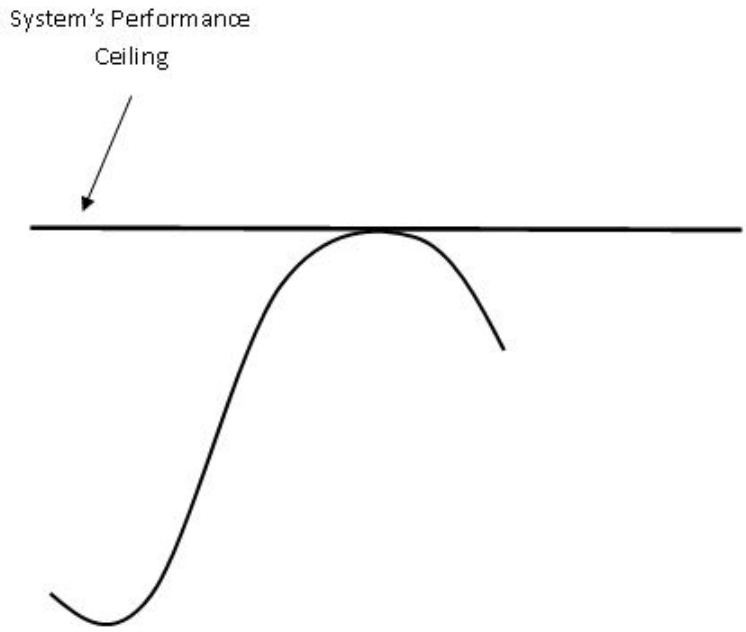
An additional reason for the inappropriateness of piecemeal change when transformation is required is that transforming a single school (or program) makes that school incompatible with its system. When a "changed part" is incompatible with its system the unchanged parts of the system will strive to overwhelm it and force it to revert back to its pre-change status. For example, the Saturn School of Tomorrow in St. Paul, Minnesota (Bennett & King, 1991) overcame great odds to establish a learning-focused, attainment-based paradigm in that school. But that new paradigm was, of course, incompatible with the controlling Industrial-Age paradigm of its school system, which then exerted powerful forces to "kill" the innovations.

Failed school-based transformation efforts like the Saturn School of Tomorrow provide ample evidence that paradigm change requires systemic transformational change. Only with district-wide transformation that creates four paradigm shifts can unparalleled improvements in student, faculty and staff, and whole-system learning be created and sustained.

One More Reason Why School Districts Need to Transform

Handy (1998) conceptualized a "Sigmoid Curve" (or S-curve) to describe the life cycle of organizations as systems. The Sigmoid Curve is a biological metaphor to help us understand the need for organizational transformation. The curve is "S" shaped as shown in Figure 1.

Figure 1: Performance Ceilings Block Further System Improvement



The bottom-left tail of the S-curve in Figure 1 represents the "birth" of a system. The steep upward slope is the system's growth phase. A system's growth phase begins to level off as it enters a maturity phase and approaches its performance ceiling.

Once a system hits its performance ceiling, no amount of tinkering with the system will push it through that ceiling. In other words, the system has reached the limits of its potential to improve and no amount

of tinkering with the existing system will create significant improvement. Branson (1987) supports the conclusion that school systems cannot improve because they have reached their performance ceilings. He suggests that traditionally designed school systems have attained about 97% efficiency. There is, in other words, simply almost no room for improvement in school systems that are designed for the Industrial-Age.

While skirting along the upper limits of a performance ceiling (which can go on for years) what worked in the past to make a system successful no longer works. Eventually, after many failed attempts to push through the performance ceiling and failing to do so, a system will enter a prolonged slow-fade toward mediocrity or obsolescence.

During the period of decline (which also can last for many years—systems never crumble in a day) educators begin experiencing significant negative emotions that constrain or diminish their ability to solve problems, seek a desirable future for their system, and collaborate for change. Leaders lose their credibility, their emotional energy is low, fear and anxiety are their motivators, and their resources for managing their systems are depleted or may disappear all together. [4]

Yet, almost inconceivably, in this slow-fade slide toward mediocrity or obsolescence educators in those declining systems continue to hang onto their old mental models, beliefs, strategies, programs, and approaches to change with the irrational hope that the next quick-fix—the next "silver bullet"—the next "flavor of the month" change—will reverse their systems' decline. They work harder and harder, do increasingly more with increasingly less, try to control declining quality with ever-increasing mandates and policies (e.g., ratcheting-up assessments, making accreditation standards more stringent, and, "fixing" the No Child Left Behind Act), and, despite all of these piecemeal, quick-fix efforts their school systems fail to break through their systems' performance ceilings.[5] While seeking quick-fix after quick-fix, their systems' performance continues sliding downwards while scapegoats are identified and blamed for the systems' declining performance.

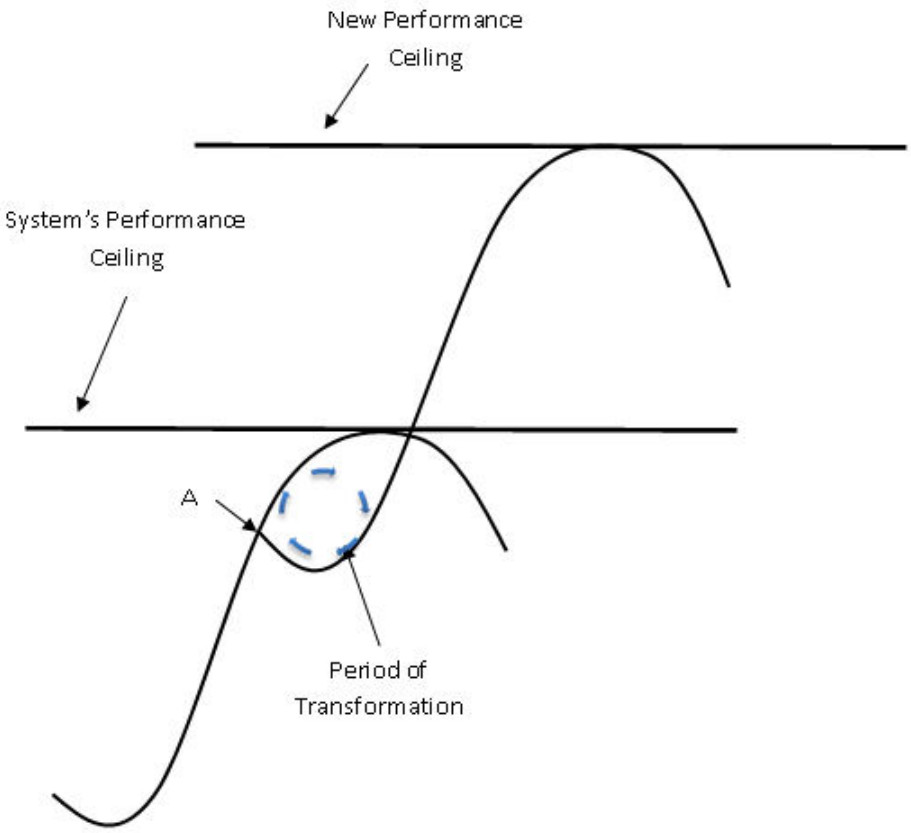
Unable to understand why they cannot improve their systems educators stubbornly keep using piecemeal improvement strategies designed to tweak or tinker with their school systems' performance with the hope that this time—this one last desperate time—the promise of significant improvement will become a reality; but it does not. It cannot, because the old systems are up against their performance ceilings and life at the top of the S-curve is inescapably suppressed by the systems' performance ceiling; or, the old systems are slipping downward on their S-curves, thereby making significant improvement exceedingly difficult. And, the emotional toll that this deteriorating situation takes on educators in those systems is significant as they swim in a turbulent emotional sea of anger, frustration, and, in some cases, despair as their efforts to improve their systems fail year in and year out.

But there is a way to escape the downward slide toward mediocrity and obsolescence. The escape occurs by breaking through the system's old performance ceiling to reach new performance heights. Breakthrough is achieved by starting a new S-curve before the system hits its performance ceiling and enters a period of decline; that is, the best time to launch a systemic change effort is at point "A" shown in Figure 2. In other words, as Burke (2007) tells us, the best time to introduce significant change to a system is when it is doing well.

[4] These conclusions are derived from the literature on organizational theory and design; e.g., see Daft (2006).

[5] For information about the failures of quick fixes please see the references for Braun (2002) and Gibson, Levine, & Novak (2006, May 2).

Figure 2: To Break Through Its Performance Ceiling a System Must Transform by Creating a new S-Curve



Point A is an arbitrary point that will vary from school system to school system; but, ideally, for all school systems, point A should be positioned somewhere along a system's upward climb toward its performance ceiling. If point A is not on the upward slope of a system's performance curve then creating and sustaining transformational change will be more challenging for the reasons discussed above.

Further, the second S-curve must create and sustain a system that is significantly different from what it was in the past; that is, the new S-curve must create and sustain the four paradigm shifts identified earlier. If the second S-curve does not create and sustain those four paradigm shifts then all that educators do is create a clone of the old system with all of its old unsolvable performance problems. And a new system that is a clone of the old is doomed to fail in exactly the same ways as the old system did; or, as Albert Einstein (and others) once observed, "If you keep doing what you're doing, you'll keep getting the results you've been getting."

Because educators cannot completely shut down their school systems to transform them their new system (their new S-curve) is first created as a parallel organization (e.g., see Fisher & Brin, 1991); that is, the new system is created as change leaders and their colleagues envision their ideal new system, adopt a transformational change methodology and tools (e.g., the School System Transformation Protocol, Duffy & Reigeluth, 2008), create a change structure to support and guide the transformation of their system, define

the operational characteristics of their ideal system, and, then, finally, implement their plans for creating and sustaining their transformed system. At a point that will vary from district to district, the parallel organization and the current system will merge to create a transformed school system. As the old and new merge, the old system will be driven out as the nascent system emerges.

In Figure 2, the period of systemic transformation where the old and new systems merge exists in the space created by the intersection of the old S-curve with the beginning of the new S-curve. This period of transformation is complex, ambiguous, and messy. Moving a system successfully through that transformation phase requires change leaders who are masters of the art and science of transforming school systems (a requirement that is discussed later in this article) and who possess significant courage, passion, and vision.

Dysfunctional System Dynamics Require Transformational Change

Throughout this article the term "systemic transformational change" has recurred. Over the past decade the notion of systemic transformational change has emerged as a methodology that is needed to significantly change all kinds of organizations; for example, consider the following excerpt from an article by Amy Zegart in The Washington Post on Sunday, July 08, 2007, about the failures of the intelligence system in the United States to prevent the ghastly September 11, 2001 attack. She said that the FBI and the CIA missed 23 potential opportunities to disrupt the September 11th attack. She identified the causes of this failure as:

1. Agency cultures that led officials to resist new ideas, technologies and missions;
2. Promotion incentives that rewarded the wrong things; and
3. Structural weaknesses that hampered those agencies and prevented them from working as a unified team. (p. B5)

With regard to the structural deficiencies of the FBI, she said, "Individuals were not the problem. The FBI was. The bureau's highly decentralized structure...meant that what should have been a nationwide effort was instead the focus of a few people..." (p. B5).

It does not require a very big stretch of our ability to recognize similar patterns of behavior to see how what Zegart says about the failures of the U.S. intelligence system also applies to school systems; for example, the struggles of many U.S. school systems have root causes anchored in:

1. School system cultures that motivate faculty and administrators to resist new ideas, technologies and missions;
2. Incentives that reward the wrong things; and,
3. Structural weaknesses such as over-decentralization (as in school-based management where each school essentially is its own system) and piecemeal approaches to change that hamper a school system from working as a coherent, unified system.

School districts, like the U.S. intelligence system, can benefit from systemic transformational change. But, systemic transformational change in education requires educators in school systems to break free of their controlling mental models for how their systems perform so they can create and sustain substantially different systems for delivering education services to students—systems transformed to meet the requirements of the 21st Century Information-Age.

Three Paths to Systemic Transformational Change

Earlier, three change paths that must be followed simultaneously to create and sustain systemic transformational change were identified. In this section, additional details about those three paths are offered.

Over the past 50 years a lot has been learned about how to improve entire systems (e.g., Ackoff, 1981; Banathy, 1996; King & Frick, 1999, Pasmore, 1988; Pava, 1983a, 1983b; Reigeluth, 1994). One of the core principles of whole-system transformation that emerges from this literature is that three sets of key organizational variables must be transformed simultaneously (e.g., see Ackoff, 2001; Duffy, 2003; Duffy, Rogerson & Blick, 2000; Pasmore, 1988). I characterize these three sets of variables as change paths. Each of these change paths is explored briefly below.

Path 1: Transform a district's core and support work processes. Core work is the most important work of any organization. In school districts, the core work is teaching and learning.

Core work is maintained and enriched by support work. In school districts, there are two kinds of support work: academic and non-academic. Academic support work roles include instructional technologists, school and district-level administrators, instructional supervisors, education specialists, and school librarians, among others. Non-academic support work includes cafeteria workers, janitors, bus drivers, and others. Support work is important to the success of a school district, but it is not the most important work. Classroom teaching and learning is the most important work and it must be elevated to that status if a school system wants to increase its overall effectiveness.

When transforming a school system, both the core and support work processes must be redesigned. Further, entire work processes must be examined and transformed, not just their parts (e.g., not just the language arts curriculum, or not just the high school program). One of reasons that entire work processes must be transformed is because of a system improvement principle expressed as "upstream errors flow downstream" (Pasmore, 1988).

The "upstream errors flow downstream" principle reflects the fact that if mistakes are made early in a work process and not corrected, the mistakes flow downstream, are compounded, and create more problems later on in the process; for example, Hoover (2002, p. 1) points out that "...we know that if the child is not making progress in reading by the third grade, there is very little likelihood that she will ever, regardless of the intervention used, be able to read at the same level as her same-age peers." Upstream errors always flow downstream!

While transforming a school system's core work process is absolutely critical for the future success of a school district, focusing only on improving the student learning part of the core work process is a piecemeal approach to transformation. A teacher's knowledge, literacy, and skills are probably some of the most important factors influencing student learning (e.g., see Sanders & Rivers, 1996, to learn more about what happens to students when they have two or three ineffective teachers in succession). So, taking steps to improve teacher knowledge, literacy, and skills must also be part of any school district's transformation efforts.

Further, while improving student and teacher learning are two important goals of improving the core work process in a school district, this is also a piecemeal approach to improving a school district because a school system is a knowledge-creating organization and it is, or should be, a learning organization. Professional knowledge must be created and embedded in a school district's operational structures and organizational learning must occur if a school district wants to develop and maintain the capacity to provide children with a high quality education and provide faculty and staff with a motivating and satisfying work life. So, school system learning (i.e., organizational learning) must also be part of a district's transformation strategy.

Path 2: Transform a district's internal "social infrastructure." Improving core and support work processes to improve learning for students, faculty and staff, and the whole school system is an important transformation goal but it is still a piecemeal approach to change. It is possible for a school district to have a fabulous curriculum with extraordinarily effective instructional methodologies supporting it but still have an internal social "infrastructure" (which includes organization culture, organization design, communication patterns, power and political dynamics, reward systems, and so on) that is de-motivating, dissatisfying, and demoralizing for teachers and staff. De-motivated, dissatisfied, and demoralized teachers cannot and will not use a fabulous curriculum in remarkable ways. De-motivated, dissatisfied, and demoralized support staff cannot and will not perform their duties in value-adding ways. So, in addition to improving how the work of a district is done, transformation efforts must focus simultaneously on improving a district's internal social "infrastructure."

The social infrastructure of a school system needs to be redesigned at the same time the core and support work processes are redesigned because it is important to assure that the new social infrastructure and the new work processes complement each other. The only way to assure this complementarity is to make simultaneous improvements to both elements of a school system.

Path 3: Transform a district's relationship with its external environment. A school district is an open system. An open system in organization theory (e.g., see Daft, 2006) is one that interacts with its environment by exchanging a valued product or service in return for needed resources. If change leaders want to transform their districts to become a learner-centered, knowledge-creating school systems they need to have a positive

and supporting relationship with stakeholders in their districts' external environment. They need positive and supporting relationships to make important changes within their districts; so, they have to transform their districts' relationships with key external stakeholders.

Hopefully, this three-path metaphor makes sense because the principle of simultaneous improvement along the three paths is absolutely essential for effective systemic transformational change (e.g., see Emery, 1977; Pasmore, 1988; Trist, Higgin, Murray, & Pollack, 1963). In the literature on systems improvement this principle is called joint optimization (Cummings & Worley, 2001, p. 353). This systemic approach to transforming school systems, while considerably more challenging than piecemeal change, is possible and is indeed being carried out successfully in all kinds of organizations, including the Metropolitan School District of Decatur Township, Indiana.[6] Furthermore, I believe it is the only approach that can help school districts break through their performance ceilings by creating and sustaining a new S-curve—a significantly different system transformed to meet the needs of our 21st Century society.

Leading Systemic Transformational Change Requires Living with Paradox

The world of systemic transformational change is one colored by paradoxical dilemmas. The color of paradox is grey. The world of systemic transformational change is covered in a diaphanous veil that must be lifted by the artful application of change leadership skills to expose, examine, and cope with the paradoxes beneath. As Richard Farson observed in Duffy (2006),

As people make their way up the management ladder, they deal less and less with problems and more and more with what the late philosopher Abraham Kaplan called predicaments—permanent, inescapable, complicated, paradoxical dilemmas. Problems can be solved, but predicaments can only be coped with (p. 180).

Leading systemic transformational change is an exercise in solving paradoxical dilemmas and tolerating ambiguity. This kind of leadership demands change leaders who are masters of the art and science of transforming school systems and who have extraordinary courage, passion, and vision. Mastering the art and science of transformation requires mastery of three sets of competencies (Duffy, 2009):

- Mastering Awareness: becoming skillful in collecting, analyzing, interpreting and reporting need data (which push people toward change) and opportunity data (which draw people toward change).
- Mastering Intention: becoming skillful in creating and communicating a compelling and emotionally powerful vision of a desirable future for a school system.
- Mastering Methodology: becoming skillful in using a methodology especially designed to create and sustain systemic transformational change and the tools that are part of that methodology.

Conclusion

Despite the paucity of real-life examples of systemic transformational change in school districts, it is being strongly advocated. An example of advocacy for systemic transformational change is found in a new initiative launched by the Association for Educational Communications and Technology (AECT) called FutureMinds: Transforming American School Systems.

The FutureMinds initiative has an inspiring and far-reaching change agenda. It aims to train teams of professionals in selected state departments of education to lead the creation and sustainment of transformational change in local school systems in their states. The ultimate goal of this transformational change initiative is to help school systems create and sustain transformational change that results in the four paradigm shifts that were described earlier as,

- Paradigm Shift 1: shift from the Industrial-Age paradigm of teaching and learning to an Information-Age paradigm; and, include the support work processes in a school system within this shift.
- Paradigm Shift 2: shift from a command and control organization design to a participatory organization design.
- Paradigm Shift 3: shift from a reactive stance in response to the environment to a proactive stance.

[6] You may visit their website at http://www.indiana.edu/~syschang/decatur/ the_change_effort.html (<http://www.indiana.edu/~syschang/decatur/%20the_change_effort.html>). The change effort is being facilitated by Dr. Charles Reigeluth of Indiana University.

- Paradigm Shift 4: shift from a piecemeal approach to change to a systemic transformational change approach.

Finally, there is substantial evidence documenting a robust interest in systemic transformational change in school systems; e.g., see Burney, 2004; Houlihan & Houlihan, 2005; Simmons, 2006; Wright, 2004; the report by the New Commission on the Skills of the American Workforce titled "Tough Choices or Tough Times"; the Educational Commission of the States' report, "Bending without Breaking"; and the National Education Commission on Time and Learning's 1994 report, "Prisoners of Time." This interest is also validated by professional educators like Joe Simpson, the Deputy State Superintendent of Schools for Wyoming and former Deputy Director of the Council of Chief State School Officers who commented on his state department's interest in systemic transformational change and then identified several other state departments of education that he thought were also interested in that approach to improving school systems. Many professional educators like Joe Simpson recognize that America's school systems need to be transformed—not tweaked, not tinkered with—not improved one building or one program at a time—if these systems are to become something fundamentally different than what they are today. They fully understand that the caterpillar needs to transform into a butterfly; not have wings strapped to its chrysalis.

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